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10/617,547	07/10/2003	Lawrence R. Plotkin	10010828-1	4281

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EXAMINER	
ECHELMEYER, ALIX ELIZABETH	
ART UNIT	**PAPER NUMBER**
1795	

NOTIFICATION DATE	DELIVERY MODE
07/24/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/617,547	PLOTKIN, LAWRENCE R.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18,27-50 and 73-93* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18,27-50,73-93* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response

1. This Office Action is in response to the arguments filed April 10, 2008. Claims 1-18, 27-50 and 73-93 are pending and are rejected finally for the reasons given below.

Claim Objections

2. The objections to the claims are withdrawn in light of the arguments filed April 10, 2008.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 5-13, 27-32, 35-37, 40, 76, 81 and 93 are rejected under 35 U.S.C. 102(e) as being anticipated by Kindler et al. (US Patent 6,440,594).

Regarding claims 1, 2, 5, 27-29, 40, 48 and 49, Kindler et al. teach a direct oxidation fuel cell system comprising a plurality of anodes, cathodes and electrolyte and a fuel reservoir. The fuel is provided to the anode by an aerosol generator, or fuel ejector, located within the anode chamber of the fuel cell. The fuel is provided as an

aerosol of liquid fuel droplets suspended in a gas. The aerosol generator may use one or two fluid nozzles (abstract; Figure 1; column 1 lines 64-67; column 2 lines 1-11).

The amount of fuel delivered to the anode depends on the particular oxidation catalyst used in the anode, the permeability of the membrane, the fuel concentration in the droplets, and the temperature and pressure within the cell. The fuel amount delivered is controlled by a controller, such as a digital or analog computer (column 7 lines 62-67; column 8 lines 1-4).

As for claims 6-9, Kindler et al. teach a tank for methanol that also receives the exhaust from the fuel cell (column lines 26-46). Kindler et al. do not specifically teach that the byproduct would mix with the fresh fuel, but it is the position of the examiner that this mixing would occur inherently, as liquids are known to mix with each other. MPRP 2112.02

Regarding claims 10-13, 76 and 81, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10).

With regard to claims 30, 32, 36 and 37, Kindler et al. teach a recovery tank within the fuel cell system in addition to the tank for fresh fuel (Ref. 19 of Figure 1; column lines 26-46).

With regard to claim 31, Kindler et al. teach bottled oxygen for the cathode side of the fuel cell reaction (column 5 lines 51-54; reference 26 in Figure 1).

As for claims 35, Kindler et al. teach a sensor for monitoring the functions of the fuel cell. The input from the sensors is used to control the fuel delivered to the fuel cell (column 7 lines 61-67; column 8 lines 1-4).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 4, 33, 34, 38, 39, 43, 44, 46-50, 86 and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. (US 2002/0172851).

The teachings of Kindler et al. as discussed above are incorporated herein.

Kindler et al. teach removing a byproduct of the reaction to be returned to the cell (Figure 1), and that the fuel delivered to the electrochemical cell is provided in a stoichiometric relationship appropriate for the function of the electrochemical reaction (column 10 lines 13-32).

Kindler et al. teach that water is contained in the methanol delivered to the anode (column 6 lines 13-20) and that water produced in the fuel cell is removed from the cathode to prevent flooding (column 16 lines 32-40).

Kindler et al. further teach that water is added to the fuel stream to reduce fuel crossover, but state that too much water in the fuel can cause flooding and degrade cell performance (column 1 lines 46-52). One of ordinary skill in the art would recognize that discovering the optimum amount of water to add to the fuel, which can be considered a

stoichiometric amount, is necessary to ensure proper function of the fuel cell. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. MPEP 2144.05 (II B)

Regarding claim 46, Kindler et al. teach the ratio of byproduct to fuel may be controlled by the amount of fuel delivered to the fuel cell. Since the controller of Kindler et al. monitors the cell output or power, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10) it can monitor the amount of fuel being consumed. By controlling the fuel delivered to the fuel cell, it would inherently control the amount of unreacted fuel byproduct (column 7 lines 62-67; column 8 lines 1-4).

As for claim 47, Kindler et al. teach a tank for methanol that also receives the exhaust from the fuel cell (column lines 26-46). Kindler et al. do not specifically teach that the byproduct would mix with the fresh fuel, but it is the position of the examiner that this mixing would occur inherently, as liquids are known to mix with each other. MPEP 2112.02.

With further regard to claim 50, Kindler et al. teach a recovery tank within the fuel cell system in addition to the tank for fresh fuel (Ref. 19 of Figure 1; column lines 26-46).

With regard to claims 86 and 91, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10).

Kindler et al. fail to teach that the water produced in the fuel cell is provided to the inlet stream.

Corey et al. teach a water management system for a fuel cell. The system includes removing water from the cathode and providing it in the anode supply ([0078]).

It would be desirable to use the teaching of Corey et al. to remove excess water at the cathode and provide it to the anode supply, since the anode supply of Kindler et al. already includes water, and it would reduce the amount of waste provided by the fuel cell as well as reduce the amount of resources (i.e. water) consumed in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to take water removed at the cathode and provide it to the anode supply, as taught by Corey et al., in the fuel cell of Kindler et al., since it would reduce the amount of waste provided by the fuel cell as well as reduce the amount of resources (i.e. water) consumed in the fuel cell.

7. Claims 14-18, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Takahashi (US Patent 5,746,985).

The teachings of Kindler as discussed above are incorporated herein.

Kindler et al. teach the electronically controllable drop ejection device of the instant invention but fail to teach a resistor coated with a catalytic material.

Takahashi teaches a heating resistor, excellent in heat transmission, inside a fuel-reforming device. The resistor is further embedded in a catalyst, which allows heat

to be transmitted to the catalyst more efficiently, causing the reaction to start more rapidly (column 2 lines 63-67; column 3 lines 1-6).

It is taught by Takahashi that using a resistor embedded in a catalyst is desirable since it is more efficient and causes the reaction to occur more rapidly than the system of Kindler et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the fuel-mixing chamber of Kindler et al. with the resistor embedded in a catalyst of Takahashi in order to make a more efficient system in which the reaction of the fuel occurs more rapidly.

8. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey as applied to claim 44 above, and further in view of Takahashi et al.

The teachings of Kindler et al., Corey et al. and Takahashi et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. teach the electronically controllable drop ejection device of the instant invention but fail to teach a resistor coated with a catalytic material.

Takahashi teaches a heating resistor, excellent in heat transmission, inside a fuel-reforming device. The resistor is further embedded in a catalyst, which allows heat to be transmitted to the catalyst more efficiently, causing the reaction to start more rapidly (column 2 lines 63-67; column 3 lines 1-6).

It is taught by Takahashi that using a resistor embedded in a catalyst is desirable since it is more efficient and causes the reaction to occur more rapidly than the system of Kindler et al. in view of Corey et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the fuel-mixing chamber of Kindler et al. in view of Corey et al. with the resistor embedded in a catalyst of Takahashi in order to make a more efficient system in which the reaction of the fuel occurs more rapidly.

9. Claims 73-75 and 78-80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. as applied to claims 1 and 27 above, and further in view of Scheifler et al. (US Patent 6,372,483).

Kindler et al. teach a drop ejection device for providing fuel to an electrochemical cell but fail to teach that the device is an inkjet, thermal or piezoelectric drop ejection device.

Scheifler et al. teach dispensing fluids, and further teach that inkjet ejectors, such as thermal or piezoelectric ejectors are commonly used to dispense droplets of fluids (column 3 lines 37-56).

It would be advantageous to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

10. Claims 83-85 and 88-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. as applied to claims 43 and 48 above, and further in view of Scheifler et al.

The teachings of Kindler et al., Corey et al. and Scheifler et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. teach a drop ejection device for providing fuel to an electrochemical cell but fail to teach that the device is an inkjet, thermal or piezoelectric drop ejection device.

Scheifler et al. teach dispensing fluids, and further teach that inkjet ejectors, such as thermal or piezoelectric ejectors are commonly used to dispense droplets of fluids (column 3 lines 37-56).

It would be advantageous to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. in view of Corey et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this

variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. in view of Corey et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

11. Claims 77 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. as applied to claims 1 and 27 above, and further in view of Fan et al. (US 2003/0044666) and Lee et al. (US 5,789,585).

The teachings of Kindler et al. as discussed above are incorporated herein.

Kindler et al. fail to teach a stainless steel anode and transition metal cathode.

Fan et al. teach a foam stainless steel anode for an electrochemical device, stating that it is an effective methanol diffuser ([0019]).

It would be desirable to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it functions as a methanol diffuser, which would help to diffuse the fuel of Kindler et al. in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it is a methanol diffuser.

Lee et al. teach a transition metal oxide cathode (column 6 lines 57-58).

Lee et al. further teach that the transition metal oxide cathode maintains electrical conductivity.

It would have been desirable to use the cathode of Lee et al. in the fuel cell of Kindler et al. since it maintains electrical conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cathode of Lee et al. in the fuel cell of Kindler et al. since it maintains electrical conductivity.

12. Claims 87 and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. as applied to claims 43 and 48 above, and further in view of Fan et al. and Lee et al.

The teachings of Kindler et al., Corey et al., Fan et al. and Lee et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. fail to teach a stainless steel anode and transition metal cathode.

Fan et al. teach a foam stainless steel anode for an electrochemical device, stating that it is an effective methanol diffuser ([0019]).

It would be desirable to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it functions as a methanol diffuser, which would help to diffuse the fuel of Kindler et al. in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. in view of Corey et al. since it is a methanol diffuser.

Lee et al. teach a transition metal oxide cathode (column 6 lines 57-58).

Lee et al. further teach that the transition metal oxide cathode maintains electrical conductivity.

It would have been desirable to use the cathode of Lee et al. in the fuel cell of Kindler et al. in view of Corey et al. since it maintains electrical conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cathode of Lee et al. in the fuel cell of Kindler et al. in view of Corey et al. since it maintains electrical conductivity.

Response to Arguments

13. Applicant's arguments filed April 10, 2008 have been fully considered but they are not persuasive.

The claim objections are discussed above.

Beginning on page 15, Applicant continues the argument from previous responses that an aerosol is not a jetting device. The examiner maintains that an aerosol is a jetting device, capable of delivering a measured stream of liquid droplets.

Applicant, on page 16, contrasts a jetting device, e.g. of an inkjet printer, with an aerosol, alleging that the two are different. The examiner directs Applicant to Lou et al. (US 6,585,349), which discloses that, “In an inkjet printer, [ink] deposits are typically stray aerosol ink droplets." In other words, this prior art reference discloses that inkjet printers create aerosol ink droplets. Applicant's argument that "ink-aerosol" printers does not make sense - this is an argument of semantics. Just because an ink-jet printer is called so and not an ink-aerosol printer does not mean that it does not produce an aerosol.

As for Applicant’s statement that the examiner’s arguments are an “interesting academic exercise in the world of patent examination” and “nonsense to one of skill in the art”, the examiner holds that one of ordinary skill in the art would recognize that an aerosol is a measured stream of liquid droplets. The "world of patent examination" is, in fact, the world in which patentability is determined.

On page 17, in the second paragraph, Applicant contends that a “stream” is an “unbroken flow.” As discussed in the Office Action of January 11, 2008, when a user of an aerosol can dispenses the contents of the can, as long as the user is depressing the nozzle to allow the contents to exit, the stream is unbroken. Applicant has also repeated the argument that an aerosol is not organized into a stream, and again the examiner disagrees. One of ordinary skill in the art would recognize that the contents of, for example, an aerosol can, are directed at a target.

Also, as discussed with the Lou et al. reference, an ink-jet printer will disperse drops of ink haphazardly (abstract). Applicant's argument that an aerosol disperses droplets haphazardly while a jetting device does not is not convincing.

As for the arguments concerning claims 6, 10, 37 and 47, as well as claims 3, 13, 33, 38, 73-75 and 77-80, 82-85, 88-90, Kindler et al. teaches a drop ejection device since, as discussed above, *drops* of liquid are *ejected* in the form of an aerosol.

As for claim 8, the liquid stream has been discussed above.

With regard to claim 31, the oxygen tanks hold oxygen, thus it is stored in the second fluid chamber. Oxygen is complementary to the oxidative process; fuel is capable of undergoing an oxidative reaction. Oxygen is complementary because it complements the process - the oxidation of fuel could not take place without oxygen. Fuel is contained in the first storage tank, the methanol tank seen in Figure 1 of Kindler et al.

As for the rejection over the combination of Kindler et al. in view of Corey et al., the examiner holds that Kindler et al. teach a jetting device, and that the combination with Corey et al. is within the ordinary level of skill in the art.

Regarding claim 4, Applicant is directed to the second paragraph of the 103(a) rejection, where it is stated that Kindler et al. teach that the fuel delivered to the

electrochemical cell is provided in a stoichiometric relationship appropriate for the function of the electrochemical reaction (column 10 lines 13-32 of Kindler et al.).

As for the arguments concerning Takahashi et al., the arguments are not convincing. As previously stated in the rejection of January 11, 2008, Applicants argue that the heating resistor of Takahashi is taught in a reforming reactor, and not a drop ejection device.

The instant invention claims a resistor in a catalyst, and that the catalyst is reactive with a component in the chemical in the oxidative reaction. By reacting the oxidant chemical with a resistor covered in a catalyst, a reforming reaction occurs. Thus, the jetting device of the instant invention becomes a reforming reactor.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer
Examiner
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